Title

GARAGE DOOR OPENER

Cross Reference to Related Applications

[0001] This application claims priority from China Patent Application No. 02138400.2, filed 30 September 2002.

Federal Research Statement

[0002] (Not applicable)

Background of Invention

[0003] The present invention relates to a garage door opener.

[0004] US-A-RE36703E and US4750118 disclose a garage door opener with a coding system for controlling the position of a barrier (door) comprising multiple transmitters and a single receiver. The first of at least one radio frequency transmitters has a first non-user changeable code for transmitting a first radio frequency transmission. A radio frequency receiver is adapted to receive the first radio frequency transmission from the first radio frequency transmitter and to receive a second radio frequency transmission from a second radio frequency transmitter having a second non-user changeable code different from the first non-user changeable code. A program mode designator is adapted to designate a program mode. A memory comprises a plurality of storage locations. A processor has a processor controlled code location pointer and is responsive to a program mode designation and to the reception by the radio frequency receiver of the first radio frequency transmission for storing a first stored code corresponding to the first radio frequency transmitter in one of the plurality of storage locations derived from the processor controlled code location pointer. The processor is responsive to the program mode designation and to the reception by the receiver of the second radio frequency transmission for storing a second stored code corresponding to the second

radio frequency transmitter in another of the plurality of storage locations derived from the processor controlled code location pointer. After storage of the first stored code, the processor is responsive to an operating mode and to the reception of the first radio frequency transmission for moving the barrier. After storage of the first and the second stored codes, the processor is responsive to the operating mode and to the reception of the second radio frequency transmission for moving the barrier. Because the garage door opener puts the codes in a single memory, when a radio frequency transmitter is misplaced, the program mode designator designates the program mode and each radio frequency transmitter transmits a program signal to program the memory. However under the program mode, a code signal transmitted by an unlawful radio frequency transmitter may also be memorially programmed by the memory allowing the unlawful radio transmitter to open the garage door.

Summary of Invention

[0005] An object of the present invention is to provide a garage door opener which can selectively disable the code signal of a radio frequency transmitter stored in the memory whilst not impairing the use of other radio frequency transmitters.

[0006] Thus the present invention provides a garage door opener comprising at least two radio frequency transmitters (*eg* two, three, four, five or six radio frequency transmitters), a radio frequency receiver, at least two memories and a processor. Each memory corresponds to one radio frequency transmitter and stores its code. The radio frequency receiver is connected to the processor by electrical connectors.

[0007] The present invention advantageously improves security performance relative to conventional systems. The processor in the host computer has no program mode and responds only to an operating mode thereby having no capability to respond to unlawful radio frequency transmitters. Each one of the multiple memories corresponds to one radio frequency transmitter so that when

a radio frequency transmitter is misplaced, its corresponding memory is eliminated so that the processor cannot read the code stored in the corresponding memory and the radio frequency transmitter is disabled while ensuring that other radio frequency transmitters may be used normally.

Brief Description of Drawings

[0008] FIG. 1 is a schematic diagram of an embodiment of the invention.

Detailed Description

[0009] FIG. 1 illustrates an embodiment of a garage door opener of the invention comprising a first radio frequency transmitter 3 and a second radio frequency transmitter 1. The first and second radio frequency transmitters 3, 1 can both produce a non-user changeable radio frequency code signal.

[0010] A radio frequency receiver 2 is adapted to receive the code signal from the first and second radio frequency transmitters 3, 1. The codes produced by the first and second transmitters 3, 1 are different.

[0011] A first memory 5 stores a code of the first radio frequency transmitter 3 and a second memory 7 stores a code of the second radio frequency transmitter 1. The first and second memories 5, 7 are both inserted on a printed circuit board by connectors by which they are connected to the processor 4.

[0012] When the radio frequency receiver 2 receives a code signal from a radio frequency transmitter and sends it to the processor 4, the processor 4 decodes the code signal and compares the decoded codes with those stored in each memory 5, 7. Once a match is identified, the processor 4 sends a signal to control operation of the garage door 6.

[0013] When one of the radio frequency transmitters 3, 1 is lost, only the memory 5, 7 corresponding to the lost transmitter is eliminated or removed so that the code stored in the lost transmitter is disabled. A new radio frequency transmitter and a memory corresponding to the new radio frequency transmitter replaces the

lost radio frequency transmitter and the eliminated or removed memory so that the garage door opener remains operable.

[0014] While this invention has been described with reference to certain specific embodiments and examples, it will be recognized by those skilled in the art that many variations are possible without departing from the scope and spirit of this invention, and that the invention, as described by the claims, is intended to cover all changes and modifications of the invention which do not depart from the spirit of the invention. Although some embodiments are shown to include certain features, it is specifically contemplated that any feature disclosed herein may be used together or in combination with any other feature on any embodiment of the invention. It is also contemplated that any feature may be specifically excluded from any embodiment of an invention.